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The total number of species of flowering plants reported as found in the state is 1,997; and of cryptogamic plants of all kinds, including ferns, mosses, liverworts, lichens, algæ, and parasitic fungi, 1,027. Much more remains to be done; and with active botanical workers in the state, the chances are that before long there will be a greater list of veritable species reported from Kansas than from any other state, except California.

THE PROPAGATION OF ERYTHRONIUMS.

By E. B. KNERR, Atchison, Kan. Read before the Academy January 2, 1897.

Possibly none of our native flowering plants are more interesting than the Erythrונים, or dog-tooth violets or adder-tongues, as they are popularly known. Certainly none are more beautiful.

Along the bluffs of the Missouri river we find but two species—the Erythronium albidum and the Erythronium mesochoreum; however, in the woods about my Ohio home, I was familiar with the Erythronium americanum as well as Erythronium albidum.

In this paper I desire to present an account of the various modes of propagation by corms followed in the three species mentioned.

Whoever has studied botany is well aware of the fact that our native Erythrונים present two forms of plants—a two-leaved flowering form and a single-leaved sterile form. Now it is these sterile or flowerless forms which I have found so interesting, and which most writers in descriptive botany seem to have inexcusably overlooked, and to these I would especially direct attention at the present time.

In both Erythronium americanum or yellow adder-tongue of the East, and in E. albidum, the white dog-tooth violet of the Mississippi valley, the flowerless forms are exceedingly numerous, covering almost completely with a continuous mat of erect, glossy, richly-mottled leaves the sloping sides of the shaded ravines where they occur. The explanation for this wealth of vegetation is not far to seek. Carefully remove a specimen of the one-leaved form of the yellow adder-tongue from the rich leaf-mold in which it grows, and usually three or more offshoots will be observed to have taken their rise from the parent corm. These offshoots are quite brittle, and hence care must be exercised in taking up the plants. At the end of each shoot will be found a slight enlargement, which develops into a corm by the time the parent plant and runners have withered. These corms are capable of producing only one-leaved plants the next season. Thus, where this year appeared but one plant, next year in close proximity will spring up three and possibly four plants to represent it, provided that meanwhile some hungry wood-mouse, mole, grub or worm has not made a dinner of some of the young and tender, juicy corms. A peculiarity of the offshoots in E. americanum is that at first they are usually directed upward, so that they may even rise above ground; and then they bend gracefully over and again seek to enter the spongy leaf-mold, planting the terminal corm, sometimes after devious turnings and twistings, as much as 6 or 8 inches, or possibly 10, from the site of the parent plant. The advantage of new forage ground is thus gained for the progeny plants. Occasionally flowering forms will also be found whose corms throw out offshoots. Of course such corms will not flower next season, and will send up only single leaves because of their divided vitality. This fact explains

why the yellow *Erythronium* seldom blooms the second season after being transplanted to a garden.

In *Erythronium albidum* we notice a similar feature of the sterile forms. However, in this species I have never found more than two offshoots to spring from each corm, and I have examined hundreds. Furthermore, the runners of *E. albidum* are first directed downward at an angle and then curve upward, finally planting the new corms, developed at the ends of the runners, at a distance of three to eight inches from the parent corm. This doubling of corms will soon mat a woodland hill slope. Seldom, however, will more than a single offshoot from a flowering corm be found; and then its displacement is not more than an inch or two, and most frequently is only the merest fraction of an inch, scarcely rupturing the old corm coat. In fact, the new corm for next year's growth is generally developed right at the base and to one side of the old corm. Because of this fact the corms in both *albidum* and *americanum* are seldom found in an erect position in the soil, but rather set at an angle, and even almost horizontal at times.

And now what is the meaning of all this? When, if ever, do these thousands of one-leaved dog-tooth violets and yellow adder-tongues bloom? What a glorious sight it would be if that whole shaded hill slope bordering the woodland creek should some spring day take a notion to bloom forth, each of the thousands of corms bearing its nodding bell of pink and white; or if that old Ohio ravine should just for one May day be a blaze of golden adder-tongues! Such thoughts would come to us in our boyhood days as we roamed those ravines in early spring for treasures for our herbariums, but no hopes for their realization had ever been seriously entertained, and we were content to search for the few stars in the fields of mottled green, which found, with what diligence did we ply the collector's trowel lest we should be so luckless as to cut off the delicate stem ere the deeply buried coveted corm was reached! But the puzzle of it all remained unsolved until we reached Kansas soil. Imagine our delight, then, when in the spring of 1890 we indeed did behold the hilltops ablaze with thousands of *Erythroniums*. What our boyhood dreams had visioned, and cool reason had denied as impossible, was here indeed a reality. Every plant bore a flower. Could this be our old friend, the *Erythronium albidum* of former days, here in Kansas under a clearer sky seeking a freer life? We thought not, and this Academy has already heard its announcement as *Erythronium mesochoreum*, a new species, at the Ottawa meeting, in 1891.

What interests us to-day is the fact that this species opens up the secret of propagation and flowering in the *Erythroniums*. Seeking out some of the one-leaved, flowerless forms (for indeed they will have to be sought for), and removing them with the utmost care from the ground, you will fail to find on them any runners whatever. Nor do the flowering forms bear runners or offsets. Instead, the new corms are developed at the base, a little to one side, and yet within the fold of the old corm. Furthermore, a well-established flowering plant will have a succession of corms within corms to the number of three or even four or five. This difference in the corm structure ought to account for the difference in flowering habits of the several species, and so it does.

But how came this difference in structure? We observed in both *E. americanum* and *E. albidum* that sometimes the flowering corms also gave rise to runners with secondary corms at their extremities. Such accidents in growth can only be explained by environment. The corms of *E. americanum* and *E. albidum*, growing in the easily yielding leaf-mold, find no difficulty in producing offshoots; and so long as such is their condition and position, they continue to

divide their energies and produce a multitude of corms, none of which have sufficient material from which to build up a flowering stem. But let some of them be covered to a considerable depth with heavier soil, either by freshets or through other accident, and the propensity to throw off runners is at once checked; as a result, in a year or two sufficient nourishment is stored and vitality accumulated to send up two leaves instead of one and unfold from their embrace the prettiest of wild flowers. In evidence, the flowering forms will be found to always have their corms very much deeper than the sterile forms.

Erythronium mesochoreum, the form with the more slender and unmottled leaves, confirms this explanation. Appearing as it does some ten days or two weeks earlier than *E. albidum*, when as yet the woodland ravines are scarcely out of the icy grasp of winter, it must needs occupy more sunny ground. But in such position it must compete with other sun-loving plants that later in the season claim their day. For it there is no soft, spongy leaf-mold, as a rule, but the hard, close mat of sod above. To develop runners is out of the question; so each seedling as it wins a footing begins at once to push its bulb almost straight downward. Each year finds it a step lower and with all its vitality conserved, not divided, as in the case of its more easy-going sisters, *albidum* and *americanum*. Hence it is that before many years it has strength to bloom, and thus, coming more promptly to the flowering stage, the one-leaved forms of this species are comparatively rare.

A PROVISIONAL LIST OF THE FLOWERING PLANTS OF McPHERSON COUNTY.

By H. J. HARNLY, McPherson, Kan. Read (by title) before the Academy January 2, 1897.

Believing that complete lists of the plants of many and widely distributed localities are essential to a complete knowledge of the flora of Kansas and its distribution, we venture to submit the following provisional list of the flowering plants of McPherson county. It is needless to say that the list is as yet far from complete. We hope to add to it from time to time. We are pleased to acknowledge the valued assistance of our some-time pupil, Mr. Claude Shirk, who has borne the burden of the work.

1. *RANUNCULACEÆ.*

1. *Anemone patens.*
2. *Delphinium azureum.*

2. *PAPAVERACEÆ.*

3. *Argemone platyceras.*

3. *CRUCIFERÆ.*

4. *Sisymbrium canescens.*
5. *Brassica sinapistrum.*
6. *Capsella bursa-pastoris.*
7. *Lepidium virginicum.*

4. *VIOLACEÆ.*

8. *Viola palmata.*
9. *Viola palmata* var. *cucullata.*

5. *CARYOPHYLLACEÆ.*

10. *Silene antirrhina.*

6. *PORTULACACEÆ.*

11. *Portulaca oleracea.*

7. *MALVACEÆ.*

12. *Callirrhoe involucrata.*
13. *Callirrhoe digitata.*
14. *Malvastrum coccineum.*
15. *Hibiscus trionum.*

8. *GERANIACEÆ.*

16. *Oxalis violacea.*
17. *Oxalis stricta.*